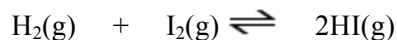


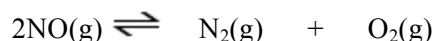
More Complex Equilibrium Problems

A 1.00 L flask is filled with 1.000 mol of H_2 and 2.000 mol of I_2 at 448°C . The value of the equilibrium constant K_c for the reaction



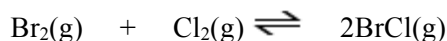
at 448°C is 50.5. What are the equilibrium concentrations of H_2 , I_2 , and HI in moles per liter?

At 2000°C the equilibrium constant for the reaction



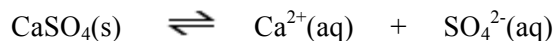
is $K_c = 2.4 \times 10^3$. If the initial concentration of NO is 0.200 M , what are the equilibrium concentrations of NO , N_2 , and O_2 ?

For the equilibrium



at 400K , $K_c = 7.0$. If 0.30 mol of Br_2 and 0.30 mol of Cl_2 are introduced into a 1.0 L container at 400K , what will be the equilibrium concentrations of Br_2 , Cl_2 , and BrCl ?

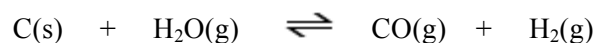
Consider the reaction



At 25.0°C the equilibrium constant is $K_c = 2.4 \times 10^{-5}$ for this reaction. If excess calcium sulfate is mixed with water at 25.0°C to produce a saturated solution, what are the equilibrium concentrations of each ion? If the resulting solution has a volume of 3.0L , what is the minimum mass of calcium sulfate needed to achieve equilibrium?

Multiple Concept Problem

At temperatures near 800°C, steam passed over hot coke (a form of carbon obtained from coal) reacts to form CO and H₂:



The mixture of gases that results is an important industrial fuel called *water gas*.

- (a) At 800°C the equilibrium constant for the reaction is $K_p = 14.1$. What are the equilibrium partial pressures of H₂O, CO, and H₂ in the equilibrium mixture at this temperature if we start with solid carbon and 0.100 mol of H₂O in a 1.00 L vessel?
- (b) What is the minimum amount of carbon required to achieve equilibrium under these conditions?
- (c) What is the total pressure in the vessel at equilibrium?
- (d) At 25°C the value of K_p for this reaction is 1.7×10^{-21} . Is the reaction endothermic or exothermic?
- (e) To produce the maximum amount of CO and H₂ at equilibrium, should the pressure of the system be increased or decreased?